



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/826,945	04/17/2004	Kuok San Ho	SJO920000165US2	1611

7590 07/14/2005

International Business Machines Corporation
IP Law L2PA/010
5600 Cottle Road
San Jose, CA 95193

EXAMINER

KLIMOWICZ, WILLIAM JOSEPH

ART UNIT	PAPER NUMBER
----------	--------------

2652

DATE MAILED: 07/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/826,945

Applicant(s)

HO ET AL.

Examiner

William J. Kimowicz

Art Unit

2652

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-35 is/are pending in the application.
- 4a) Of the above claim(s) 15, 16, 21, 28, 29, 34 and 35 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13 and 14 is/are allowed.
- 6) ☒ Claim(s) 17-20, 22-27 and 30-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continuation

Patent Application Serial Number 10/826,945 is a DIVISIONAL of U.S. Patent Application Serial Number 10/054,656 filed on January 18, 2002, which is now U.S. Patent No. 6,754,056.

Claim Status

Claims 1-12 have been cancelled by the Applicants in a Preliminary Amendment filed on April 17, 2004.

Claims 13-35 are currently pending.

Election/Restrictions

Applicants' election without traverse of Species I (corresponding to FIGS. 11-13), which Applicants contend read on Claims 13, 14, 17-20, 22-27 and 30-33, filed May 13, 2005, is acknowledged.

Claims 15, 16, 21, 28, 29, 34 and 35 are currently withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the Response filed on May 13, 2005.

Information Disclosure Statement

The information disclosure statement filed April 17, 2004 fails to comply with 37 CFR 1.98(a)(1), which requires the following: (1) a list of all patents, publications, applications, or other information submitted for consideration by the Office; (2) *U.S. patents and U.S. patent application publications listed in a section separately from citations of other documents*; (3) *the application number of the application in which the information disclosure statement is being submitted on each page of the list*; (4) *a column that provides a blank space next to each document to be considered, for the examiner's initials*; and (5) a heading that clearly indicates that the list is an information disclosure statement. The information disclosure statement has been placed in the application file, but the information referred to therein has not been considered.

Claim Objections

Claim 30 is objected to because of the following informalities and appropriate correction is required.

The following phrase(s) lack clear antecedent basis within the claim(s), i.e., either the particularly recited passage fails to be properly introduced prior to its appearance at that point in the claim or the structure recited in the passage is not an inherent part of or component of the previously recited structure. The lack of antecedence as noted *infra*, is merely formal, since the claims can be understood in light of the instant specification and drawings; the antecedence informalities delineated below do not rise to the level of a rejection under 35 USC 112 2nd paragraph:

Art Unit: 2652

(I) Claim 30 (line 40), "said head surface."

Claim 30 is also objected to because with regard to claim 30 (line 43 and 44), the word -- assembly-- should be inserted after the phrase "magnetic head" in order to remain consistent with the preceding claim language.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 17-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Hayashi (US 2001/0005300 A1).

As per claim 17, Hayashi (US 2001/0005300 A1) discloses a method of making a magnetic head assembly (10) that has an air bearing surface (ABS) (36) comprising the steps of: making a read head (10) including the steps of: forming a current perpendicular to planes (CPP) sensor (i.e., current is transmitted to the sensor perpendicular to the major planes of the sensor via electrode/shields (14, 28)) having a central portion (defined by sensor width between vertical

Art Unit: 2652

bias layers (161, 162)) of which defines a track width of the read head (10) and first and second side portions (e.g., portions of the lateral extensions of free layers (18) that extend beyond the central region and which are overlying the vertical bias layers (161, 162)) on each side of the central portion; a making of said central portion of the sensor including the steps of: forming a ferromagnetic pinned layer (22) that has a magnetic moment; forming an antiferromagnetic pinning layer exchange (24) coupled to the pinned layer (22) for pinning the magnetic moment of the pinned layer (22); forming a ferromagnetic free layer structure (18) that has a magnetic moment; and forming a nonmagnetic spacer layer (20) located between the free layer structure (18) and the pinned layer (22); a making of said first and second side portions of the sensor including the steps of: forming first and second lateral extensions (which extend beyond stack (25, 24, 22)) of the free layer structure (18) respectively; and forming first and second electrically nonconductive antiferromagnetic (AFM) layers (161, 162) exchange coupled (i.e., vertical biasing layers which are exchange couple to free layer extensions to minimize Barkhausen noise) to the first and second lateral extensions of the free layer structure (18) respectively for longitudinally biasing the first and second lateral extensions of the free layer structure (18) respectively.

As per claim 18, wherein each of the first and second AFM layers (161, 162) is composed of nickel oxide (NiO). See paragraph [0042].

As per claim 19, further comprising the steps of: making a write head (34 - FIG. 2) including the steps of: forming ferromagnetic first (64) and second pole (68) piece layers that have a yoke portion located between a pole tip portion and a back gap portion (see FIG. 2); forming a nonmagnetic write gap layer (72) located between the pole tip portions of the first and

Art Unit: 2652

second pole piece layers (64, 68); forming an insulation stack (insulative layers supporting the coil (66)) with at least one coil layer (66) embedded therein located between the yoke portions of the first (64) and second pole (68) piece layers; and the first and second pole piece layers being connected at their back gap portions (not expressly shown in FIG. 2 but which must inherently occur in order to magnetically couple the flux that originates from the coil (66) into the pole pieces (64, 68) in order to sustain a closed magnetic loop which bridges into the magnetic medium at flux gap (72)); the read head (10) further including: a ferromagnetic first shield layer (14); and the sensor (10) being located between the first shield layer (14) and the first pole piece layer (64).

Claims 17-20, 22-27 and 30-33 are rejected under 35 U.S.C. 102(e) as being anticipated by Jayasekara (US 6,833,982 B2).

As per claims 17, 22 and 30, Jayasekara (US 6,833,982 B2) discloses a method of making a magnetic head assembly (e.g., 98) that has a head surface comprising: forming a read head (see, e.g., FIG. 2B) that has a current perpendicular to planes (CPP) sensor (i.e., current flows between leads L1 and L2 perpendicular to planes of (108, 110, 112 and 114) as is known in a CPP sensor); a making of the CPP sensor comprising the steps of: forming a ferromagnetic pinned layer (110) that has a magnetic moment (pinned magnetization); forming an antiferromagnetic pinning layer (108) exchange coupled to the pinned layer (110) for pinning the magnetic moment of the pinned layer (110); forming a ferromagnetic free layer structure (114) that has a magnetic moment (free magnetization); and forming a nonmagnetic spacer layer (112) between the free layer structure (114) and the pinned layer (110); forming each of the pinned

Art Unit: 2652

layer (110) and the spacer layer (112) with first and second side surfaces which are perpendicular to the head surface (i.e., perpendicular to the ABS surface); forming first and second electrically nonconductive antiferromagnetic (AFM) layers (116, 116) with the first AFM layer (e.g., "left side" 116 as seen in FIG. 2B) interfacing the first side surfaces of the pinned (110) and spacer layers (112) and the second AFM layer (e.g., "right side" 116 as seen in FIG. 2B) interfacing the second side surfaces of the pinned (110) and spacer layers (112) so as to define a track width of the read head (98) between said first and second side surfaces of the pinned (110) and spacer layers (112); forming the free layer structure (114) with first and second lateral extensions (i.e., portion of (114) that extend over and are in contact with portions (116)) which extend laterally away from first and second side extremities respectively of said track width, and forming said first and second AFM layers (116, 116) exchange coupled to the first and second lateral extensions (of (114)) respectively commencing at said first and second side extremities of the track width respectively and extending laterally therefrom for longitudinally biasing the first and second lateral extensions respectively of the free layer structure (114) and thence a central portion of the free layer structure within said track width. See in particular, COL. 7, line 14 through COL. 8, line 11).

Additionally, as per claim 30, forming a housing (e.g., included with the DASD as is known); forming a magnetic medium (200) in the housing; forming a support (212) mounted in the housing for supporting the magnetic head assembly with said head surface facing the magnetic medium (200) so that the magnetic head assembly is in a transducing relationship with the magnetic medium (200); forming means (204) for moving the magnetic medium (200); and connecting a processor (218) to the magnetic head assembly (via (222)) and to the means for

Art Unit: 2652

moving (204) - via (220) - for exchanging signals with the magnetic head assembly and for controlling movement of the magnetic medium (200).

As per claims 23 and 31, further comprising the steps of: forming the free layer structure (114) with first and second free layers (e.g., see COL. 7, line 65 through COL. 8, line 2); forming the first free layer (originally etched portion of free layer (114)) within said track width and with first and second side surfaces that are coextensive with the first and second side surfaces respectively of the spacer layer (112); forming the first and second AFM layers (116, 116) also interfacing the first and second side surfaces respectively of the first free layer (114); and forming the second free layer (portion of free layer added after the etching and over (116)) with said central portion and further with said first and second lateral extensions of the free layer structure (114).

As per claims 18, 24, 27 and 33, wherein each of the first and second AFM layers (116, 116) is formed of nickel oxide (NiO) - COL. 7, line 36 and COL. 8, lines 4-6, etc.).

As per claims 19, 25 and 30, further comprising the steps of: forming a write head (194) comprising the steps of: forming ferromagnetic first (P1) and second (P2) pole piece layers that have a yoke portion located between a pole tip portion (portion proximate ABS) and a back gap portion (portion not depicted, but inherently provided providing the requisite flux connection path between (P1) and (P2) as is known); forming a nonmagnetic write gap layer (G3) between the pole tip portions of the first and second pole piece layers (P1, P2); forming an insulation stack (I1, I2, I3) with at least one coil layer (C) embedded therein between the yoke portions of the first and second pole piece layers (P1, P2); and connecting the first and second pole piece

Art Unit: 2652

layers at their back gap portions (as required to provide the requisite flux closure as is known); a making of the read head (192) further comprising the steps of: forming a ferromagnetic first shield layer (S1); and forming the sensor (196) between the first shield layer (S1) and the first pole piece layer (P1) - see FIG. 5.

As per claims 20, 26 and 32, wherein the free layer structure (114) is formed between pinned layer (110) and the first pole piece layer (P1) - see FIG. 2 B in conjunction with FIG. 5.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi (US 2001/0005300 A1).

See the description of Hayashi (US 2001/0005300 A1), *supra*.

As per claim 20, although Hayashi (US 2001/0005300 A1) does not expressly disclose wherein the ordering of the elements of the read head (10) are reversed such that the free layer structure (18) is located between the pinned layer and the first pole piece layer, Official notice is taken that “top” and “bottom” spin valve read sensors are notoriously old and well known and ubiquitous in the art; such Officially noticed fact being capable of instant and unquestionable demonstration as being well-known.

In other words, Hayashi (US 2001/0005300 A1) discloses an MR stack layered sensor conventionally known as a “top” spin valve structure, wherein the pinning/pinned layer is located at the top; however, as is well known in the art, the layers of an MR spin valve read head can be readily reversed without affecting the function or operation of the MR read sensor to produce a spin valve head conventionally known in the art as a “bottom” spin valve sensor, wherein the bottommost layer of the spin valve is the pinning/pinned layer, with the topmost layer being the free layer. In the art, these two variations of spin valve head (i.e., “top” spin valve and “bottom” spin valve) are art recognized equivalents.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the stack ordering of elements of the head of Hayashi (US 2001/0005300 A1) arranged in an inversed manner, i.e., changing the “top” spin valve structure of Hayashi (US 2001/0005300 A1) as is known, to a “bottom” spin valve sensor, as is known, such that the free layer structure (18) is located between the pinned layer and the first pole piece layer as per claims 4 and 9.

The rationale is as follows: one of ordinary skill in the art would have been motivated to

Art Unit: 2652

provide the stack ordering of elements of the head of Hayashi (US 2001/0005300 A1) arranged in an inversed manner, i.e., changing the “top” spin valve structure of Hayashi (US 2001/0005300 A1) as is known, to a “bottom” spin valve sensor, as is known, such that the free layer structure (18) is located between pinned layer (and the first pole piece layer) as per claims 4 and 9, since “top” and “bottom” spin valve sensors are art recognized equivalents in the art, which perform the same function, in the same way yielding the same result. No new or unobvious result is seen to be obtained, or is *prima facie* apparent based on the Applicants’ specification (i.e., no argued advantages of such known reverse ordering), as it pertains to changing the MR sensor order to a “bottom” spin valve sensor, other than being an obvious expedient or choice of design.

Allowable Subject Matter

Claims 13 and 14 are allowed.

Conclusion

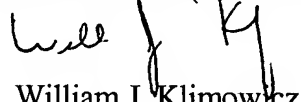
The prior art made of record and not relied upon is considered pertinent to applicants’ disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William J. Klimowicz whose telephone number is (571) 272-7577. The examiner can normally be reached on Monday-Thursday (6:30AM-5:00PM).

Art Unit: 2652

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (571) 272-7579. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


William J. Klimowicz
Primary Examiner
Art Unit 2652

WJK